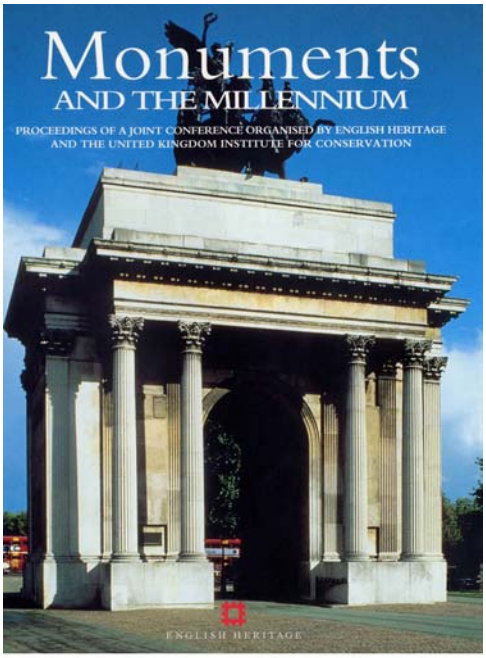

Cover for *Monuments and the Millennium*, 2001.

Anniversaries are useful things. They encourage us to remember the past and to take stock of where we have been. By implication, they also invite us to consider the future that lies ahead. A few years ago, the fiftieth anniversary of the end of the Second World War commanded global attention and invited us to reflect upon warfare raging in our own time. In the United States during 1997 we celebrated another fiftieth anniversary, marking the racial integration of major league baseball when Jackie Robinson took the field in 1947 as the new second baseman of the Brooklyn Dodgers. In so doing we also considered the gains made in racial integration in our society in the intervening years and the challenges that still remain.

In 1998, the United States marked the centennial of the Spanish-American War, an event that Americans remember as their first major assertion of national will on the world scene, and the beginning of what we in the US have modestly come to call The American Century. Perhaps this is why we, as a nation, are having some difficulty fully embracing the new century lurking on the horizon. Having fared very well during the twentieth century, we may now be realising the difficulty in going for two in a row.

Setting aside our trepidation about the new century, this is a good time to take stock of how

Figure 1 Daniel Chester French and Edward Clark Potter, *General Ulysses S. Grant Monument*, 1897, bronze and granite, Kelly and Fountain Drives, Fairmount Park, Philadelphia, PA. Photograph of dedication ceremonies, 1899. (Anonymous)

we are caring for the monuments that we have built to mark the people and events that are important to us. In the United States, our major period of monument building in bronze and stone was powered in large part by remembrance of the Civil War that had torn the nation apart from 1861 to1865. The lion's share of our bronze monuments were created roughly between 1875 and 1925, so we are presently marking the centennial of the high water mark of that phenomenon. It was in 1897 that the Ulysses S. Grant Monument was built in Philadelphia to memorialise the commanding general who had been the victor when the bloodshed stopped (Fig 1). Today the monument is subject to an ongoing maintenance programme which began its conservation in 1983, leading us to consider another anniversary of sorts. We are also marking the twenty-fifth anniversary of the first real efforts by conservators in the US to address the need to care for what is now a vast collection of outdoor bronze sculpture. How we are doing as stewards of this class of cultural patrimony? At the risk of damning by faint praise, I'd say that we're doing better than we were a few years ago, but setbacks are sometimes equal the gains we have made. While many bronzes have been conserved during the past quarter century, relatively few receive the subsequent maintenance that they require. In addition, while many stewards of public sculpture turn to experienced conservators for the help they need, many others subject the bronzes in their care to damaging treatments carried out by contractors whose expertise, shall we say, lies elsewhere. Such are the bronze conservation challenges that lie before us as we greet the new century and the new millennium.

Figure 2 August Zeller, *Schuylkill County Soldiers' and Sailors' Monument*, 1891, bronze & granite, Pottsville, PA. Detail of sandblasted bronze & granite surfaces, 1988. (Montagna)

Figure 3 *Hamilton White Monument*, 1905, bronze and granite, Syracuse, New York, 1987. (Dennis Montagna)

Let us begin with some conservation history. Concerted efforts to clean outdoor bronze sculpture appear to have been relatively rare in the United States before the early 1970s (Weil 1987). The bronze cleaning that did occur generally used readily available commercial and industrial cleaning methods. Sandblasting and acid cleanings were the most widespread of these methods and usually had a devastating effect on bronze sculpture. Hard, jagged sand particles coupled with the relatively high pressure levels used by sandblasters, or the combination of acid cleaners and scouring, removed virtually all corrosion products, and they did it quickly. The sandblasting that damaged the bronze and polished granite components of the Pottsvile Soldiers and Sailors Monument in Pottsville, Pennsylvania was completed in the space of a morning (Fig 2). Typically, these cleanings were carried out not by trained conservators, but by general contractors, by cleaning companies, or by misguided volunteers. These cleanings either left the bare bronze surface to weather once again, or followed by application of a clear lacquer coating or paint. Seldom was the coating properly formulated or adequately applied and maintained. The Hamilton White Monument in Syracuse, New York was sandblasted and coated with a clear lacquer in the early 1970s (Fig 3). Remnants of the unmaintained coating are visible only in sheltered areas visible on the right of the photograph, and the rest of the bare metal surface is corroding anew. By the 1970s, American art conservators, trained in the care of museum objects, had become increasingly interested in the conservation of outdoor works of art. Working in conjunction with the scientific community, conservators began to examine more closely the phenomena of bronze corrosion and to develop conservation treatments that included a range of mechanical and chemical cleaning methods. The chemical cleaning methods usually consisted of acidic or alkaline strippers that were both labour-intensive and often difficult to control. Some of the mechanical techniques employed abrasive pads and dental tools, while others centred on the use of various abrasive media fed into a controlled air flow.

Best-known of the air abrasive methods, glass bead peening was developed at this time and quickly became the leading bronze cleaning

Figure 4 Henry L. Ellicott, *First Pennsylvania Cavalry Monument*, 1890, bronze and granite, Hancock Ave, Gettysburg National Military Park, Gettysburg, PA. Glass bead peening of the monument's bronze figure, 1979. (GNMP Archives)

Figure 5 Jean Antonin Mercie, *Robert E. Lee Monument*, 1890, bronze and granite, Monument Ave, Richmond, VA. Detail of the bronze equestrian group after glass bead peening and repatination in 1982, 1983. (Dennis Montagna)

system by the mid-1970s (Fig 4). While many viewed peening as a gentler alternative to sandblasting, it too was designed to remove all corrosion products from the bronze surface. The system's spherical glass particles, delivered at 60-80 psi, were thought to leave the bronze substrate intact, unlike sandblasting in which a jagged-shaped media, delivered with typically higher blasting pressures, would tear into softer bronze surfaces. Following cleaning, a new chemical patina and a protective lacquer coating were usually applied (Weil 1980). Glass bead peening gained in popularity during the mid 1970s due, in part, to its use as the method for cleaning prominent monuments in New York City's Central Park, Saint Louis, Missouri, and Richmond, Virginia (Fig 5). Within a few years many conservators began to question the concepts behind glass bead peening: that the presence of any corrosion products were inherently harmful and must be removed to effectively preserve bronze statuary, and that the cleaning process itself did not further compromise the bronze surface.

Laboratory analysis conducted by Smithsonian Institution conservators and the National Bureau of Standards, coupled with the field experience of practising conservators, indicated that such aggressive treatments were really not needed to insure the long-term preservation of bronze sculpture. More importantly, glass bead peening was shown to remove metal from bronze substrates (Veloz &

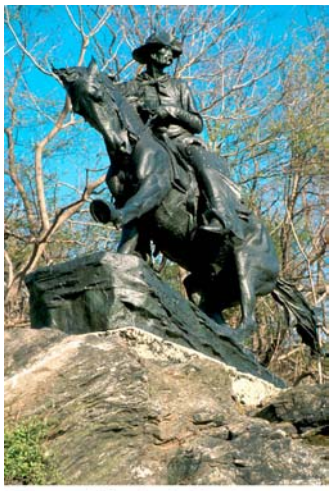

Figure 6 Frederic Remington, *Cowboy*, 1908, bronze, Kelly Dr, Fairmount Park, Philadelphia, PA. View of the sculpture after eight years of annual maint-aince of the wax coating, 1990. (Dennis Montagna)

Chase 1989). Consequently, the bronze conservation field made a concerted shift toward the use of less invasive cleaning methods. In essence, this shift is based on a conservation theory that favours preservation and stabilization of the bronze surface over attempts to restore them to an original colouration by replacing the corrosion products, sometimes called 'the patina of time', with an entirely new chemical patina.

Throughout the 1980s, glass bead peening was supplanted by gentler cleaning methods. The least invasive of these involved a simple soap and water washing, followed by an application of microcrystalline waxes, usually to a heated bronze surface. This became the method of choice for the Baltimore Bronze Project, a conservation programme begun in 1981 (The Baltimore Bronze Project 1989). During the programme's five-year duration, conservators treated 45 bronzes. Two years later, in 1983, the same method was used to clean and coat 25 bronze monuments in Philadelphia (Fig 6) (Bach 1985, Tatti 1985). These cleaning projects depended heavily on adherence to a coating maintenance regimen. Philadelphia's bronzes have been inspected and maintained each spring for the past 15 years.

As the bronze cleaning programmes were getting underway in Philadelphia and Baltimore, other conservators were developing air abrasive cleaning procedures that sought a more thorough,

Figure 7 Antoni Popiel, *Brigadier General Thaddeus Kosciuszko Monument*, 1910, bronze and granite. Lafayette Park, Washington, DC. Detail of walnut shell blasting of a corroded bronze surface. The lighter-toned area has been cleaned of dirt and friable corrosion products in preparation for an application of a protective coating, 1987. (Dennis Montagna)

yet gentle, removal of grime and superficial corrosion products. Low-pressure blast cleaning with soft agricultural media strives to leave intact the denser, more firmly-adhered corrosion products and the metal substrate beneath them. Pulverized walnut shells have become the most widely used of the agricultural media (Fig 7) (Montagna 1989, Veloz & Chase 1989). Embodied in this gentler cleaning method is an intent to provide a surface able to receive a renewable protective coating, usually a wax or a lacquer. These less invasive cleaning methods often obviate the need to carry out the extensive surface repatination required by methods that stripped bronzes to bare metal. Typically when hot wax coatings are applied to walnut shell blast cleaned surfaces, they saturate and darken them, often approximating the appearance of a repatinated surface.

However, conservation treatments often include the manipulation of the appearance of corroded bronze surfaces through repatination. Lacquer coating systems are usually selected to protect repatinated surfaces, in part because they do not saturate and darken the surface, as do heat-applied waxes. The Marshall Field Monument in Chicago's Graceland Cemetery was cleaned using walnut shell blasting (Figs 8 and 9). After cleaning, the surface was repatinated with potassium permanganate and ferric nitrate in water to achieve a reddish brown colouration, similar to that which archival research indicated the bronze had possessed historically, and then coated with lacquer (treatment of the monument was designed and carried out by conservator Andrzej Dajnowski; see also Weil 1985).

Figure 8 Daniel Chester French and Henry Bacon, *Marshall Field Monument*, c.1910, bronze and granite, Graceland cemetery Chicago, IL. View of the monument before conservation, 1996. (Andrzej Dajnowski)

Alternative cleaning systems are being explored through research and field work. Chief among them is a water blasting procedure, used at various pressures to effect a range of surface cleaning treatments. At pressures of 1500-2000 psi, the system can produce cleaning results that resemble those achieved with walnut shell blasting (Lins 1982), but higher pressures clean much more aggressively. Water blasting pressures in the 7000 psi range can strip the surface to a degree beyond the comfort level of many of us, but methods that remove much, if not all, of a bronze's corrosion products can be particularly desirable when extensive repatination, or a patina of a lighter tone is desired.

Figure 9 French and Bacon, *Marshall Field Monument*, c.1910, Graceland Cemetery, Chicago. View of the monument after conservation, 1997. (Dennis Montagna)

Figure 10 Jean Alexandre Joseph Faiguiere and Jean Antonin Mercie, *Major General Marquis Gilbert de Lafayette Monument*, 1891, bronze and marble, Lafayette Park, Washington, DC. Detail of proper right figure group after conservation, 1988. (Dennis Montagna)

Figure 11 Jean Alexandre Joseph Falguiere and Jean Antonin Mercie, *Major General Marquis Gilbert de Lafayette Monument*, 1891, Lafayette Park, Washington, DC. Detail of conserved proper right figure group three years after treatment, 1991. (Dennis Montagna)

Thus far we have mostly considered the development of methods to carry out initial cleanings of outdoor bronze statues. Indeed, the field of conservation has focused much attention upon this primary phase of monument care. But what happens next? All the cleaning treatments we've discussed presuppose adherence to a regimen of periodic inspection and coating maintenance if the benefits of an initial conservation treatment are to be retained. The wax and lacquer coating systems most frequently used for maintaining outdoor sculpture in the United States have inherent maintenance requirements. Microcrystalline waxes, usually applied to a heated bronze surface, perform best when inspected and renewed at intervals of one to three years. Lacquer coatings should be repaired when scratched or abraded. Moreover manufacturers typically advise that these coatings be completely removed and reapplied at five-year intervals. Coating tests have suggested that cold waxes applied to lacquer coatings and maintained frequently can extend the life of the lacquer. But some conservators complain that waxes used in this way hinder the repair of damaged lacquer coatings.

We possess a sufficient understanding of how to maintain the coatings we are applying, but does this maintenance take place? With the exception of Philadelphia's annual maintenance programme and a few others, not many conserved outdoor bronzes receive the maintenance they need to keep their coatings, and by extension the initial conservation treatment, viable. One conservator colleague told me that of the dozens of outdoor bronzes he has treated since beginning his practice in 1991, only two have received their planned maintenance. Monuments that are cared for by the US National Park Service have often not fared much better. A monument to General Lafayette sits directly across the street from the White House. It received a walnut shell blast cleaning and a wax coating that provided protection of the bronze and returned to the work a semblance of the lively reflective surface that it once possessed (Fig 10). But the coating did not receive a timely inspection, washing, and re-waxing, and after three years' exposure in a fairly harsh environment, it is blanched, dulled and in need of care (Fig 11).

The key challenge we face, and it may be an insurmountable one, is the implementation of long-term maintenance. Most conserved historic monuments are never maintained and the ones that do receive maintenance enjoy a maintenance treatment or two, but seldom does a maintenance programme survive the management regime that initiates it. Making a dramatic difference in the appearance of a disfigured bronze through a conservation treatment is exciting and photogenic. Maintaining that conserved appearance is not. Bronze maintenance is the conservation equivalent of keeping the floors swept, and is the activity most likely to get lost in management's inevitable press to develop new ideas and initiatives. For these reasons, it is difficult to fund maintenance without listing it as a separate item in a government's budget. In addition, because donors who fund conservation projects often thrive on the visual impact that their contribution can make, maintenance has little cachet for them and may seem rather ephemeral. When it is performed well and in a timely manner, maintenance produces no dramatic changes that can be unveiled by politicians or captured on video for the evening

Figure 12 John J. Boyle, *42nd New York Infantry Monument*, 1891, bronze and granite, Hancock Ave, GNMP, PA. View of the monument before glass bead peen cleaning, c. 1980. (GNMP Archives)

Figure 13 John J. Boyle, *42nd New York Infantry Monument*, GNMP, PA, 1891. Detail of the monument's bronze group after glass bead peen cleaning and laquer coating, 1980. (GNMP Archives)

news. Some managers of monument collections have begun to address these problems with a measure of success, in some cases by establishing legally binding fiduciary obligations to care for monuments in the public realm. In other cases, fund-raising for bronze conservation includes not nly the cost of the initial treatment, but also money used to establish an income-producing maintenance endowment to insure that funds for ongoing care will be there when they are needed.

Another approach to ensuring that coatings are maintained centres on improving their quality, longevity and maintainability. There are reasons to be both optimistic and pessimistic about this. Improvements in wax application procedures are providing hope that we can extend the life of these relatively short-lived but readily maintainable coatings. One conservator has begun using a direct-feed airless spray system to apply second coats of wax to bronzes that have received a heat-applied first coat. Several monuments conserved under the stewardship of the City of Philadelphia's Art Commission, not among those cleaned in the early 1980s, have received this type of wax application and after nearly three years in an aggressive urban environment seem to be faring quite well.

Another less optimistic but more pragmatic approach may be called for as well. As we continue to plan for maintenance when we treat outdoor bronzes, perhaps we should assume that maintenance is not likely to occur. With this in mind, we might opt not to carry out a treatment, in some cases. When we do choose to treat, maybe we should design treatments that will be able to fail gracefully.

Gettysburg National Military Park commissioned a host of glass bead peening and

Figure 14 John J. Boyle, *42nd New York Infantry Monument*, GNMP, PA, 1891. Detail of the monument's bronze group after eighteen years exposure and no maintenance of the initial treatment, 1998. (Dennis Montagna)

Figure 15 Henry Kirke Bush-Brown, *Major-General John Sedgwick Monument*, 1913, bronze and granite, South Sedgwick Ave, GNMP, PA. Detailed view of the detergent and water cleaning of the bronze surface, 1981. (GNMP Archives)

surface lacquering treatments around 1980. The Tammany Indian of the 42nd New York Infantry was cleaned at that time, depicted here just before and just after treatment (Figs 12 and 13). Those treatments have never been maintained, and, after twenty years, exhibit an advanced state of failure (Fig 14). At this point, they stand in dire need of not merely maintenance, but of extensive conservation. Even with removal of the remnants of the lacquer coating, the visual pulling together of relatively bright surfaces to the more corroded ones on more skyward facing surfaces will require considerable time, skill, and expense. By comparison, other treatments carried out at Gettysburg during the same period were much less invasive. The simple washing and waxing method used in Baltimore and Philadelphia was employed to conserve all of the park's equestrian portraits in 1981 (Figs 15). A photograph of the General Meade Monument, taken in 1996 (Fig 16), shows that these coatings went unmaintained as well, and that the wax coating had completely weathered away from the bronze's most exposed surfaces. At that time, the Park Service's Philadelphia Support Office conducted a training course for new monument maintenance staff to establish an ongoing monument maintenance programme at the park. We selected the Meade Monument as one of our training pieces and used walnut shell blasting to remove remnants of the residual wax coating before applying a new wax coating. Because this monument had not received the invasive cleaning that others at the park had, we were able to bring it back to a maintainable state by using a fairly simple cleaning and coating system.

In addition to insuring that periodic maintenance follows a conservation treatment, the other challenge before us concerns the role

Figure 16 Henry Kirke Bush-Brown, *Major-General George G. Meade Monument*, 1896, bronze and granite, East of Hancock Ave, GNMP, PA. Detailed view of the waxed bronze surface after fifteen years exposure and no maintenance of the initial treatment, during application of an initial wax coat, following walnut shell blast cleaning of the bronze surface, 1996. (Dennis Montagna)

and availability of conservation professionals able to carry out treatments. How can we ensure that appropriate treatment decisions are made and that trained and experienced minds and hands perform treatments? During the past decade, through the national Save Outdoor Sculpture! project and other initiatives, we in America have witnessed a heightened public awareness of the need to care for the outdoor bronzes that many had heretofore thought would take care of themselves. This awareness has resulted in well-conceived monument care programmes, but it has also had a downside. A public emboldened by a mission to take action and make a difference, might not always take wise action, and the difference they make might not be for the better. The bronze Mountaineer Monument that sits on West Virginia's state capitol grounds in Charleston provides a good example. It was sandblast cleaned by a construction company that responded to a Request for Proposals sent not to conservators, but to the general building trades and to commercial cleaning companies. After its sandblasting, the bronze received a heavy coating of lacquer that has formed drips in some areas and in others entrapped sand particles

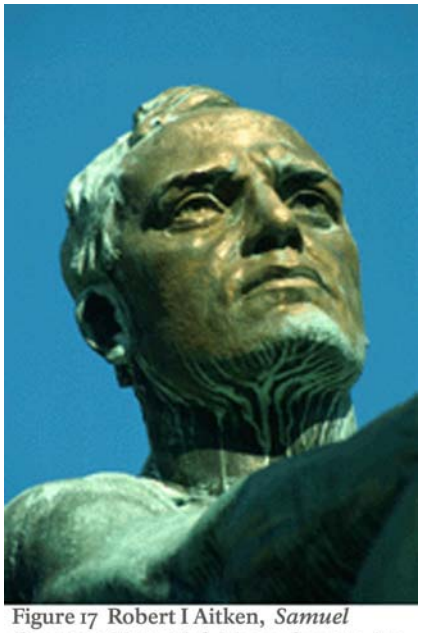

Figure 17 Robert I Aitken, *Samuel Gompers Memorial*, Massachusetts Ave at 10th Street, NW, Washington, DC. Detail of damage to surface caused by abrasive cleaning, 1987. (Dennis Montagna)

against the heavily abraded bronze surface, creating a memorial of sorts to an unfortunate treatment choice.

Another wrong turn was taken by the American Federation of Labor, when they asked the foundry who had cast their monument to labour leader Samuel Gompers in the mid-1930s to clean it for them in the late 1980s. Their cleaning method of choice utilised power-driven wire wheels with which they began to refinish the surface, much as one would clean and chase a newly-cast bronze (Fig 17). Despite the fact that this treatment was halted before it proceeded very far, and a somewhat less invasive cleaning method instituted, the new dark brown patina that the foundrymen introduced bears little resemplance to the greener patina that the bronze probably carried when it was new.

In both cases, prospective clients of conservation services looked to other trades, that made sense to them, in one case to a company that maintains buildings and in the other, to one that makes bronze sculpture. Obviously, we should enhance our efforts to guide owners of outdoor bronzes in need of conservation toward the professionals who possess the training and skills to design and carry out appropriate treatments. But beyond this we should work to increase the number of conservators capable of dealing with the challenges of treating works that do not reside in climate controlled settings, instead suffer the hardships inherent in lives spent outdoors. Arguably, treatments that will be successful in such an environment must focus at least as much upon the need for long-term maintenance as they do upon initial treatments. This is not only a matter of practicality, but one of professional ethics as well.

Only the removal of bronzes from the outdoor environments for which they were created to the protection afforded by a museum setting can guarantee their future well-being; This is seldom a feasible or an inappropriate course of action. These usually commemorative works were designed to be exhibited outdoors and, with few exceptions, they will remain there. Ultimately, is up to us as stewards of our monument collections to take decisions wisely, to work with trained conservators to plan appropriate courses of action and to use gentle cleaning methods coupled with a commitment to an ongoing maintenance program. We should also advocate treatments that will leave the work no worse off than when we found it, if the treatment is not maintained. These approaches seem to offer the best hope for preserving the irreplaceable body of monumental sculpture that has been entrusted to us by the people of the last millennium.

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